REMARKS

Claims 1-23 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over CN 1281906 to Wenji ("Wenji") in view of U.S.P.N. 4,605,449 to Schummer et al. ("Schummer") and U.S.P.N. 4,138,278 to Nakasugi et al. ("Nakasugi").

Applicants respectfully disagree. Independent claim 1 is patentable over Wenji, Schummer, and Nakasugi because the cited art does not teach or suggest the claimed composition, as a whole, including 0.40 to 0.80% Cr and 0.16 to 0.25% C. Furthermore, it would it not have been obvious to one of ordinary skill in the art to combine or modify the cited art to produce claim 1 as a predictable result or with a reasonable expectation of success because the cited art expressly teaches away from the claimed ranges and because the combination would render the cited art inoperable for its intended purpose.

The 0.40 to 0.80% Cr range

As the Office Action states, Wenji discloses Cr content within the range of 0.90 to 1.40%. See Office Action at page 4. Wenji's Cr range does not overlap with Applicants' claimed range. Furthermore, it would not have been obvious to one of ordinary skill in the art to lower Wenji's Cr content at least because Wenji states that "Cr should be no less than 0.90%." See Wenji at page 2. Therefore, Wenji discourages modifying its Cr content to 0.40 to 0.80% because it expressly teaches away from anything lower than a 0.90% Cr content.

The Office Action states that "it would have been obvious to one of ordinary skill in the art at the time of the invention to combine ... the teaching of Nakasugi of Cr content of no more than 0.6% with the teaching of Wenji of a chain composition ..." See Office Action at page 4. Applicants respectfully disagree. The combination of Nakasugi and Wenji is improper because the proposed combination would render Wenji inoperable for its intended purpose.[1] In addition, one of ordinary skill in the art would not have combined the two references because they include contrasting, and mutually incompatible, teachings regarding Cr content.

[1] It is well established that there is no motivation to combine the teachings of references when the proposed modification would render the prior art unsatisfactory for its intended purpose. See, e.g., MPEP §2143.01 V.

Wenji's intended purpose is to maintain good corrosion resistance of mooring chains, which requires Cr content to be "no less than 0.90%" because "Cr is the main element for increasing corrosion resistance of steel mooring chains in sea water." See Wenji at Abstract (Exhibit A) and page 2, emphasis added. Nakasugi while disclosing "not more than 0.6% Cr," is silent on corrosion resistance. Rather, Nakasugi states that "Chromium, when present in an excessive amount, increases the hardenability of HAZ and lowers the toughness and the resistance to the welding cracks, and therefore the upper limit of the chromium content is 0.6%." Nakasugi at column 8, lines 12-16, emphasis added. Therefore, Nakasugi contrasts, and is incompatible with Wenji because the two references achieve different functions with different amounts of Cr. One of ordinary skill in the art would understand that lowering Wenji's Cr content to be less than 0.90% would render Wenji inoperable for its intended purpose of maintaining good corrosion resistance in sea water.

In addition to the incompatible Cr content teachings, Nakasugi is also incompatible with Wenji with regard to Nb content.

As an initial matter, Applicants respectfully disagree with the Office Action that Nakasugi is "silent" with regard to Nb content (see Office Action at page 4).[2] Rather, Nakasugi at column 4, lines 3-7 clearly teaches steels that do not include any Nb:

> "Further advantages of the present steel, are that;
> (1) there is no heating problem inherent to the Nb-steels because no Nb is contained, and a very stable balance can be obtained between the strength and the toughness…"

Nakasugi at col. 4, ll. 3-7, emphasis added. Therefore, Nakasugi discourages the inclusion of Nb because it expressly teaches away from Nb-steels. In contrast, Wenji requires the presence of 0.02-0.06% Nb. Wenji at Abstract (Exhibit A). Therefore, Nakasugi and Wenji provide incompatible teachings with regard to Nb contents and one of ordinary skill in the art would not have combined the steel composition from the two references.

Schummer does not remedy the deficiencies of Wenji and Nakasugi with regard to Cr content. Rather, Schummer is silent on Cr content. See Office Action at page 4.

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[2] Applicants respectfully submit that the Office Action misreads Nakasugi in a number of ways. The Office Action states at page 4 that Nakasugi discloses Si 0.8-1.8%, Mn 0.01-0.08%, Mo <0.015%, Ni 0.2-0.4%, Al 0.08-0.4%, and Nb "silent." However, the correct contents disclosed in Nakasugi are Si 0.05-0.8%, Mn 0.8-1.80%, Mo 0.08-0.4%, Ni 0.1-2.5%, Al 0.01-0.08%, and Nb none. See Nakasugi at columns 6-9.

For the foregoing reasons, Wenji, Schummer, and Nakasugi do not teach, suggest, or otherwise make obvious the 0.40 to 0.80% Cr range recited in the composition of claim 1.

The 0.16 to 0.25% C range

Wenji, Schummer, and Nakasugi also fail to teach or suggest the 0.16 to 0.25% C range of claim 1. Furthermore, it would it not have been obvious to one of ordinary skill in the art to combine or modify the cited art to produce the claimed range as a predictable result or with a reasonable expectation of success because the *prima facie* case of obviousness is rebutted by the criticality of the claimed range, and because the cited art expressly teaches away from the claimed 0.16 to 0.25% C range.

Wenji discloses 0.25 to 0.33% C. See Wenji at Abstract (Exhibit A). The overlap of C contents is limited to a single point at the upper limit of Applicants' claimed C range. Applicants respectfully submit that the Examiner's *prima facie* case of obviousness based on overlapping ranges is rebutted by the criticality of the claimed ranges.[3] Applicants' claimed range, for example, has the following criticality:

> The C-contents located in the range from 0.08 to 0.25% by weight ensure the good low-temperature resistance of steels according to the invention. Particularly positive results are produced in this connection if the C content is from 0.16 to 0.23% by weight.

See the originally filed specification at page 4.

In contrast, Wenji discourages lowering C content below 0.25% and states: "C can increase steel strength... If lower than 0.25%, mechanical properties at the weld can not meet the strength requirements for level 4 mooring chains.... Therefore, C content is ascertained to be: 0.25-0.33%." See Wenji at page 2. Thus, Wenji does not teach or suggest how to "ensure the good low-temperature resistance" as disclosed by Applicants, nor does it teach or suggest the criticality of 0.16 to 0.25% C.

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[3] A *prima facie* case of obviousness based on overlapping ranges can be rebutted by showing the criticality of the claimed range. For example, a presumption of obviousness based on a claimed invention that falls within a prior art range can be rebutted by showing "that there are new and unexpected results relative to the prior art." *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1322, 73 USPQ2d 1225, 1228 (Fed. Cir. 2004); MPEP 2144.05 III.

Nakasugi and Schummer also fail to teach or suggest the criticality of the claimed C content range. Rather, Nakasugi discourages increasing C content above 0.16% and states that "when the carbon content is excessively large, a large amount of bainite and island martensite is formed even with Mo contents within the range from 0.80 to 0.40% to have adverse effects on the toughness and to lower the weldability. Thus the upper limit of the carbon content is set at 0.13%." See Nakasugi at column 6, lines 51-57, emphasis added. Schummer also requires lower than 0.16% C content and states that "we have found that the carbon content should be well below 0.20% and preferably should be a maximum of 0.08% for the highest energy absorption at low temperatures." See Schummer at column 3, lines 23-26, emphases added. Therefore, not only is the *prima facie* case rebutted by the criticality of the claimed range, Nakasugi and Schummer also expressly teach away from the 0.16 to 0.25% C range.

Applicants respectfully submit that with regard to Schummer's C content, the Office Action takes the reference out of context. The Office Action states that "Schummer discloses that to '[ ]have a high notch impact toughness throughout the cross section, and be easily welded, the carbon level is preferred to be less than 0.2% by weight' (Col1, line 65-68)." See Office Action at page 4. However, this quote is a part of "background of the invention" that describes prior art limitations. The full passage reads as follows:

> In order to be suitable for use as a reinforcement for a concrete containment around a liquefied gas reservoir which is subjected to temperatures between -50° C and -196° C, the concrete bar must have a high notch impact toughness throughout its cross section, and be easily welded, thereby employing a carbon level less than 0.2% by weight. When conventional concrete bar containing 0.16 to 0.2% carbon are subjected to cold twisting, it is frequently noted that they may have a sufficient yield strength but an insufficient toughness at the lower temperatures.

Schummer at column 1, line 61 to column 2, line 3, emphases added. Thus, one of ordinary skill in the art would understand that Schummer discloses that a 0.16 to 0.2% C content is undesirable. Indeed, as discussed above, Schummer requires C content to be "well below 0.20%" and preferably "a maximum of 0.08%."

For the foregoing reasons, not only is the *prima facie* case rebutted by the criticality of the claimed range, Nakasugi and Schummer also expressly teach away from the 0.16 to 0.25% C

range. As such, Wenji, Schummer, and Nakasugi do not teach, suggest, or otherwise make obvious the 0.16 to 0.25% C range recited in the composition of claim 1.

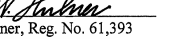
For at least the foregoing reasons, Applicants respectfully submit that independent claim 1 is patentable over Wenji, Schummer, and Nakasugi. Claims 2-23 depend upon claim 1 and thus are also patentable. Accordingly, Applicants respectfully request that the rejection of claims 1-23 be reconsidered and withdrawn.

CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and requests early favorable action. If the Examiner believes a telephonic interview would expedite the prosecution of the present application, the Examiner is welcome to contact Applicants' Agent at the number below.

Respectfully submitted,

Date: July 21, 2010



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Attachment: Exhibit A, English Abstract of CN 1281906 to Wenji.

Exhibit A

[Figure] [Publication Desc] [Granted Desc] Publication Text Granted Text

Application Number:	00109053	Application Date:	2000/06/02
Announcement Date:	2001/01/31	Pub. Date:	2003/05/14
Publication Number:	1281906	Announcement Number:	1108397
Grant Date:		Granted Pub. Date:	2003-5-14
Application Type:	Invention	State/Country:	32[China|jiangsu]
Agency Code:	11230	Agent(s):	zhang ejun
Applicant Address:			
Postcode:	214429	Field Classification:	
Title:	High-strength, high-toughness and corrosion resistant mooring chain steel and its production process		
IPC:	C22C 38/48		
Applicant(s):	Jiangyin Xingcheng Iron & Steel Co. Ltd.		
Inventor(s):	Zhang Weiji;Zhu Yiming;Li Guozhong		

Abstract:

The present invention relates to a high-strength, high-toughness and corrosion-resisting steel for mooring chain and its production process. Said steel contains (wt%) C 0.25%-0.33%, Si 0.15%-0.30%, Mn 1.45%-1.75%, Cr 0.90%-1.40%, Ni 1.00%-1.20%, Mo 0.45%-0.65%, Nb 0.02%-0.06%, Al 0.020%-0.05%, residual and harmful elements: P is less than or equal to 0.020%, S is less than or equal to 0.015%, Cu is less than or equal to 0.20%, Sn is less than or equal to 0.03%, Sb is less than or equal to 0.01%, As is less then or equal to 0.04%, B is less than or equal to 0.005%, [N] is less than or equal to 0.009%, [O] is less than or equal to 0.0020%, [H] is less than or equal to 0.0002% and the rest is Fe. At the same time the carbon equivalent must be greeter than 1.40. Said steel produced by adopting EAF+LF+VD+CCM process can be used as R4-level morring chain for semi-submerged well drilling platform, single-point mooring structure, floating tanker and other marine installation.

Claim(s):

Priority:

Exhibit A

PCT

Legal Status:[Declaration]